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THE ADULTERATION OF JAMS AND JELLIES.

Walter S. Long.

THE KANSAS standards for jams and jellies read as follows:

> "Jam, marmalade, is the sound product made from clean, sound, properly matured and prepared fresh fruit and sugar (sucrose), with or without spices or vinegar, by boiling to a pulpy or semisolid consistence, and conforms in name to the fruit or fruits used, and in its preparation not less than forty-five pounds of fruit are used to each fifty-five pounds of sugar.
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> "Jelly is the sound, semisolid, gelatinous product made by boiling clean, sound, properly matured and prepared fresh fruit with water, concentrating the expressed and strained juice, to which sugar (sucrose) is added, and conforms in name to the fruit or fruits used in its preparation."

Departure from the terms of these standards in one case alone is permitted. Manufacturers may use a glucose product wholly or in part in place of sugar, provided that the product be labeled "glucose jelly" or "glucose jam," as the case may be. The conditions as to the soundness of product, cleanliness, maturity, freshness and preparation of fruit still apply.

Any divergence from the terms of the standards, as in the use of fruit which is not fresh, unclean, unsound, not properly matured or improperly prepared, constitutes adulteration under the provision of the law, which states that "in the case of foods, an article shall be deemed adulterated if any substance has been mixed or packed with it so as to reduce or lower or injuriously affect its quality or strength."

The presence of any foreign substance, such as a preservative or an artificial color, constitutes adulteration, unless the fact that such foreign substances have been added is plainly indicated on the label, and even in that case, if damage or inferiority is concealed, or the product is made to appear better than it really is, the fact of adulteration still obtains. There are on the market products having the appearance of jellies and jams which have for their base a preparation made from inferior portions of fruits, colored in imitation of the fruit. There are others which have for a base preparations made from a cheaper fruit, generally the rejected portions of these cheaper fruits, to which has been added a quantity of a more expensive fruit, with perhaps a little added color, to give the appearance of genuineness. Such preparations are, as a matter of fact, imitations, and should be labeled as such.

The chief form of adulteration in the past—a form which obtains at present—has been and is the use of apple stock in the manufacture of all kinds of jams and jellies. Apples contain a large number of pectose bodies which favor jellification. A common method of making jellies and jams is the use of an apple stock, consisting of cider, the pressings from apple trimmings, such as cores, skins and rejected portions, or the pressings from rejected apples or from the pomace of cider mills. All these products contain more or less pectin and are used as a common base for the manufacture of jams and jellies of all kinds. Whenever apple stock, even though clean and wholesome, enters into the composition of jams and jellies made from any other fruit than the apple it becomes an adulteration. If the apple stock used is prepared from rejected portions of apples the form of adulteration becomes all the more serious.

As a case in hand, let us consider the following:

A brand of goods on the Kansas market, of which there appears to be a very large quantity, is labeled, without qualification, as follows: "Strawberry preserves." Analysis of the product shows that it contains a trace of starch, that 50 percent of the ash is phosphate, that the color is partly artificial, and that some product high in bacterial, yeast and mold content has been used. Physical examination shows a gelatinous product containing in suspension portions of strawberries. The conclusion as to the nature of the material used as base for this product may be reached in the following manner:

The trace of starch is not supplied by strawberries or sugar, since neither strawberries nor sugar contain a trace of starch.

The presence of added phosphates indicates that the substance used as a base is deficient in fruit acids, that the acidity of the product had to be increased in order to insure proper thickening in the final product.

The presence of artificial color shows that the manufacturers could not depend upon the natural color of the strawberries used to give the tint desired. Now, as a matter of fact, strawberry preserves require no improvement of their color, nor do they require the addition of acids to insure gelatinization or thickening.

Of all the fruits commonly used in the making of preserves, one alone may contain a small amount of starch, namely, the apple, and the apple may contain it only when in an immature condition. Now, if immature apples had been used as a base there would have been no need of added phosphoric acid or acid phosphate in the product above mentioned, since immature apples contain all that is necessary in the way of acid and pectose bodies required for gelatinization.

The canning factories of the country are the source of a large and cheap supply of apple waste, such as skins, cores, and rejected parts. These contain pectose bodies, are deficient in fruit acids, and contain small amounts of starch and large amounts of bacteria, yeasts and molds. When these are steamed under pressure and subsequently pressed out, a liquid is obtained containing pectose bodies, mineral salts, fruit tissues, a small amount of starch, and large quantities of dead bacteria, yeasts and molds, which on concentration with addition of sugar and phosphoric acid or acid phosphates will yield a respectable-looking jelly. Now if during the process of concentration, or later, some fruit, such as strawberries, fresh or otherwise, and a little coal-tar dye of the right shade be added, the final product will have the appearance at least and a little of the taste at most of a substance known as "strawberry preserves." This product on analysis will show abnormal amounts of phosphates, a trace of starch, artificial color, and large quantities of dead bacteria, yeasts and molds evenly distributed throughout the mass, and the physical appearance will be that of a jelly of pleasing color, holding in suspension the bedraggled remains of what are or perhaps once were beautiful red strawberries. Now in place of strawberries, other fruits or apologies for the same, such as raspberries, red or black, blackberries, cherries, and what not, with the addition of appropriate hues may be used with a corresponding turnout of raspberry preserve, red or black, blackberry preserve, cherry preserve, and what not, all founded upon the very simple, clean, strong, sound sanitary and properly matured and prepared basis above described.

As a further evidence of the conscientious concern of jelly and jam manufacturers for the welfare of the people who subsist in part upon their products, let me speak of the following case:

There is on the Kansas market a very large quantity of material of a certain brand, some of which bears on the label the word "Jelly" and some the word "Jam." Now, the manufacturers of this product, desiring that the purchaser be not mistaken in the nature of his ware, has caused these words to be printed in type so large that the surface of the container is so completely utilized that there is scarcely room for what he has to say besides, and for the splendid painting which he desires his purchaser to receive as a token of his esteem. But being a conscientious man and not willing to deceive the people, he must needs add a few qualifying remarks, and in order to do so is compelled to print these remarks with smaller type, much to his regret, and because these are important remarks. Further, in order that the effect of this painting might be enhanced he has caused the letters of these qualifying remarks to be printed in less conspicuous colors.

The qualifying remarks are many, and as follows:

(*a*) Vegetable color, trace.
(*b*) Added phosphates, trace.
(*c*) Strawberry flavor.
(*d*) Corn sirup, 70 percent.
(*e*) Apple, 30 percent.

Analysis of the product shows that our friend, the manufacturer, in his haste to show his customers a square deal, has made mistakes in several instances at least.

The "trace" of vegetable color happen to be a coal-tar dye and is present in sufficient amount to give to the product what of color it possesses. The "trace" of added phosphates amounts to as much as 50 percent of the mineral matter present. The strawberry flavor happens to be a flavorless flavor. The 30 percent apple, instead of being the fresh, sound, properly matured and prepared whole fruit, as one would naturally expect from a reading of the label and from the reputation of the producer for honesty, is our old friend "apple base." His presence is made manifest by the same old signs: a trace of starch, the necessity of added phosphates, and the multitudes of dead bacteria, yeasts and molds.

Another product put out by the same manufacturer, and of the same brand as the above, is labeled "jam." The same qualifying remarks and the same painting are present on the label, with the one additional remark, "15 percent strawberry."

Analysis of this product shows that the manufacturer has not profited by his former mistakes, but has repeated them all, with one addition—the strawberries have been left out.

These products are adulterated and misbranded. The use of the terms "glucose jelly" or "glucose jam" would only partially remedy the matter. The use of the term "imitation" would more nearly express the whole truth. To express the whole truth, the truth to which the purchaser is entitled, this word should be followed by some such statement as this, "Made from corn sirup, apple trimmings, strawberries and phosphates, and colored with a coal-tar dye."

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A METHOD FOR THE DETERMINATION OF STARCH.

WALTER S. LONG.

THE METHODS available for starch determinations may be classified under three heads: Polariscopic, reduction, and colorimetric methods. In all polariscopic and reduction methods starch is hydrolyzed to dextrose, and any method of this kind is subject to the errors involved in hydrolysis and in polarization or reduction, as the case may be. These methods, even when most carefully conducted, are incapable of yielding anything like accurate results. The results invariably come out too low, due on the one hand to the incomplete conversion to dextrose, on the other to overconversion, giving rise to condensation products having a much less or no cupric-reducing power. As to the accuracy of reduction methods it has been shown by various chemists that in calculating starch from dextrose the theoretical value is never obtained, the actual results being from 95 to 98 percent of theory.

Regarding colorimetric methods it is claimed that "while the methods are short and convenient, the results obtained are only roughly approximate." Several methods have been proposed for the direct estimation of starch, such as precipitation with a solution of iodine or barium hydroxide, but none of these methods has yielded trustworthy results.

In working with such products as jams and jellies many samples were found to contain small amounts of starch—too small for satisfactory determinations by any methods avail-